Serial No.: 10/043,849
Docket No.: UDC-20101

STATUS OF CLAIMS:

Claims 2-31 remain pending herein.

REMARKS

Rejection of Claims 2-18, 21-23 and 25-31 under 35 U.S.C. § 103(a)

Claims 2-18, 21-23 and 25-31 are presently rejected under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 6,268,695 ("Affinito") and U.S. Patent No. 5,936,345 ("Hora"). This rejection and its supporting remarks are traversed.

Claim 10, the only independent claim pending in the application, reads as follows:

> An OLED device comprising:
> (a) a substrate;
> (b) an active region positioned over said substrate, wherein said active region comprises an anode layer, a cathode layer and a light-emitting layer disposed between the anode layer and the cathode layer; and
> (c) a composite barrier layer disposed over said active region or under said active region, said composite barrier layer comprising an alternating series of one or more polymeric planarizing sublayers and one or more high-density sublayers, at least one of said polymeric planarizing sublayers having microparticles incorporated therein, said microparticles being effective to increase the out-coupling efficiency of the OLED.

One advantage of the here claimed OLED is that it has an increased out-coupling efficiency, relative to various prior art devices, resulting in a more luminous display in constructions that incorporate it.

Another advantage is that the use of a polymer multi-layer (PML) composite barrier layer (a) provides a conformal coating over an OLED device (b) that protects the OLED device from oxygen and moisture, which result in deterioration of such devices.

In the present invention, the PML structure provides both OLED device protection and increased out-coupling efficiency.

Affinito is directed to a device in which an OLED 160 is constructed over a flexible environmental barrier, specifically, a composite foundation 110. See, e.g., col. 2, line 54 to col. 3, line 13, Fig. 1, and col. 4, lines 7-10. The composite foundation 110 includes a substrate 150, a first polymer layer 132, a ceramic layer 134, and a second polymer layer 136. *Id.* (The foundation can further include an intermediate polymer layer 142 and an intermediate ceramic

layer 144. See Fig. 2.) Such polymeric and ceramic layers have been shown to render a polymer substrate (i.e., a PET substrate) more than three orders of magnitude less permeable to oxygen and water vapor than the case where a sole ceramic layer (i.e., oxide layer) is provided on the polymer substrate. *Id.* at col. 1, lines 28-33.

In contrast to polymers, ceramic layers are known to be quite impermeable to oxygen. Unfortunately, according to Affinito, in certain structures (e.g., oxide coated substrates), the oxide layer is believed to be prone to fracture, adversely affecting the barrier properties of the structure. See, e.g., col. 1, lines 43-67 of Affinito. The inclusion of polymer smoothing layers in these structures, however, is believed to cover various rough, sharp and/or uneven features, thereby protecting the oxide layer from fracture. *Id.*

As indicated in the Office Action, Affinito lacks disclosure of polymeric planarizing sublayers containing microparticles that increase outcoupling efficiency of the OLED. The examiner turns to Hora in an attempt to make up for this deficiency, referring to the barium-titanate-containing reflective isolation layer 4 described at col. 7, lines 25-34 of Hora.

By way of background, this portion of Hora describes an electroluminescent lamp, which is formed on a transparent substrate 1. A transparent electrode 2, also referred to in the electroluminescent lamp art as the front electrode (see, e.g., col. 3, lines 9-10, of Dagle et al., U.S. 5,491,379, which is cited in Hora), is provided over the transparent substrate 1. An electroluminescent layer 3 is, in turn, provided over the transparent electrode 2. Over the electroluminescent layer 3 is a reflective isolation layer 4, which may comprise an organic resin or a fluorine resin into which dielectric powders, such as barium titanate powders are dispersed. A first-side conductive layer 5, also referred to in the electroluminescent lamp art as the back electrode (see, e.g., col. 3, lines 24-25, of Dagle et al.) is provided over the reflective isolation layer 4.

The examiner urges that "it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the OLED disclosed by Affinito to have microparticles formed in a polymeric planarizing sublayer, as taught by Hora, in the composite barrier layer [of Affinito], either above or below the active region, in order to increase the amount of photons exiting the device and to thereby improve the device's efficiency, while providing a planarizing layer. "

To support a rejection for obviousness, motivation must be found in the references to

modify or combine their teachings to arrive at the claimed invention. There must be a convincing explanation on the part of the examiner and not just unsupported conclusions. See MPEP 2143.01 and the cases cited therein, including *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993).

In this case, however, the invention only appears obvious after studying the here claimed invention and combining the disclosures of the references with the application of undue hindsight. This process has long been held to be improper. See, for example, MPEP 2142, second paragraph and the cases cited therein. See also *Loctite Corp. v. Ultraseal Ltd.*, 781 F.2d 861, 228 U.S.P.Q. 90 (Fed. Cir. 1985).

For example, without undue hindsight, there is no reason why one or ordinary skill in the art would be motivated take the layer taught by Hora, which is an electrical isolation layer that is disposed between the electrodes (i.e., it is a key component of the active region) of an electroluminescent lamp, and insert it into the OLED structure of Affinito.

Furthermore, the isolation layer of Hora is reflective. In contrast, Affinito indicates that the polymeric and ceramic multilayer structures described therein address the need in the art to encapsulate light emitting organic devices (also known as light emitting polymer, or LEP, Devices) in a flexible, transparent, environmental barrier that permits viewing while preventing ingress of oxygen and water vapor from the environment. See, e.g., Affinito at col. 2, lines 1 *et seq.*

Moreover, even assuming solely for the sake of argument that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the OLED disclosed by Affinito by inserting a particle containing layer such as that described in Hora into the same, there is clearly no teaching or suggestion to use such a particle containing layer as one of the polymer smoothing layers found in Affinito.

Indeed, it is respectfully submitted that one of ordinary skill in the art would actually have been dissuaded from providing particles within one of the polymer smoothing layers of Affinito. For example, as noted above, it is understood from Affinito that the function of the polymer smoothing layers is to cover various rough, sharp and/or uneven features that may be present, thereby protecting the adjacent oxide layers from fracture. Being aware of this, it is respectfully submitted that one of ordinary skill in the art would note have included solid

particles within polymer smoothing layers such as those of Affinito. This is true, for example, because adding solid particles to a layer whose function is to cover and smooth underlying features is antithetical to achieving that function.

For at least these reasons, reconsideration and withdrawal of this rejection are respectfully requested.

Rejection of Claims 2-18, 21-27 and 31 under 35 U.S.C. § 103(a)

Claims 2-18, 21-27 and 31 are presently rejected under 35 U.S.C. § 103(a) as obvious over Affinito in view of U.S. Patent No. 4,849,296 ("Haluska"). This rejection and its supporting remarks are traversed.

Affinito has been previously discussed. As noted above, Affinito lacks disclosure of polymeric planarizing sublayers containing microparticles that increase outcoupling efficiency of the OLED. In the present rejection, the examiner turns to Haluska in an attempt to make up for this deficiency, pointing to the abstract of Haluska which reads as follows:

> Mixtures of hydrogen silsesquioxane resin and metal oxide precursors such as acyloxy and alkoxy compounds of aluminum, zirconium, and titanium can be coated on substrates and subsequently ceramified at low temperature in the presence of ammonia, with or without platinum or rhodium catalysis, to form a nitrided ceramic coating on the surface of the substrate. The nitrided coatings produced are useful as interlevel dielectric films or for planarizing and protecting the surface of electronic devices. For further surface protection, overcoating the nitrided coating with an additional layer of a passivating ceramic material and a top layer of a barrier ceramic material is also described.

As above, the invention only appears obvious after studying the here claimed invention and combining the disclosures of the references with the application of undue hindsight.

For example, the examiner argues that "[t]he planarizing layer of Haluska contains the same material disclosed by the applicants as being capable of increasing the out-coupling efficiency of an OLED, namely titanium dioxide. Therefore the titantium dioxide microparticles taught by Haluska are capable of increasing the out-coupling efficiency of an OLED."

This, however, is incorrect. Rather than describing a polymeric layer having microparticles, such as TiO_2 microparticles, incorporated therein, Haluska describes the use of alkoxy compounds of titanium to form a nitrided ceramic coating. Haluska neither discloses nor suggests a polymeric layer having TiO_2 microparticles incorporated therein.

The examiner further urges that "it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the OLED disclosed by Affinito to have microparticles formed in a polymeric planarizing sublayer in the composite barrier layer [of Affinito], either above or below the active region, in order to provide good protection to the electronic components while also providing a planarizing layer, as taught by Haluska."

Again, this is incorrect. Even assuming solely for the sake of argument that the Haluska did teach a microparticle-containing polymeric layer and assuming solely for the sake of argument that it would have been obvious to modify the OLED disclosed by Affinito by inserting such a layer into that OLED structure, there is still no reason why one of ordinary skill in the art would use such a layer as one of the polymer smoothing layers found in Affinito.

As noted above, one of ordinary skill in the art would actually have been dissuaded from providing particles within one of the polymer smoothing layers of Affinito, for example, because adding solid particles to a layer whose function is to cover and smooth underlying features is antithetical to achieving that function.

For at least these reasons, reconsideration and withdrawal of this rejection are respectfully requested.

Rejection of Claims 19 and 20 under 35 U.S.C. § 103(a)

Claims 19 and 20 are rejected under 35 U.S.C. § 103(a) as obvious over Affinito in view of Hora and further in view U.S. Patent No. 4,816,717 ("Harper") and further in view of U.S. Patent No. 6,339,289 ("Fork"). Applicant respectfully traverses this rejection and its supporting remarks.

For example, as noted above, claim 10 is patentable over Affinito and Hora.

Harper, which is cited for its alleged disclosure of an EL device having a dielectric layer containing particles of barium titanate less than 5 microns in diameter, and Fork, which is cited for its alleged disclosure of an OLED with pixels that are 300 microns across to prevent dark spots and improve imaging, do not make up for these deficiencies in Affinito and Hora. For at least this reason, it is submitted that claim 10 is patentable over Affinito, Hora, Harper and Fork.

Claims 19 and 20 depend from claim 10 and are therefore patentable over Affinito, Hora, Harper and Fork for at least the same reasons as is claim 10.

For at least this reason, reconsideration and withdrawal of this rejection are respectfully requested.

Rejection of Claims 19 and 20 under 35 U.S.C. § 103(a)

Claims 19 and 20 are rejected under 35 U.S.C. § 103(a) as obvious over Affinito in view of Haluska and further in view Harper and further in view of Fork. Applicant respectfully traverses this rejection and its supporting remarks.

For example, as noted above, claim 10 is patentable over Affinito and Haluska. Moreover, Harper and Fork do not make up for the deficiencies in Affinito and Haluska. For at least this reason, it is submitted that claim 10 is patentable over Affinito, Haluska, Harper and Fork.

Claims 19 and 20 depend from claim 10 and are therefore patentable over Affinito, Haluska, Harper and Fork for at least the same reasons as is claim 10.

For at least this reason, reconsideration and withdrawal of this rejection are respectfully requested.

CONCLUSION

Applicant submits that all pending claims are in condition for allowance, early notification of which is earnestly solicited. Should the Examiner be of the view that an interview would expedite the application at large, request is made that the Examiner telephone the Applicant's attorney at (703) 433-0510 in order to resolve any outstanding issues.

FEES

The Office is authorized to charge any fees required to deposit account number 50-1047.

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